WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2005MO47B

Title: Improved Modeling for Runoff and Soil from Natural Events

Project Type: Research

Focus Categories: Climatological Processes, Models, Water Quality

Keywords: Soil erosion, precipitation, rainfall, kinetic energy, surface and water quality

Start Date: 03/01/2005

End Date: 02/28/2006

Federal Funds: $21,958

Non-Federal Matching Funds: $43,916

Congressional District: 9th

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Abstract

Laboratory experiments that simulate soil erosion from precipitation suffer from a lack of transferability to the natural situation because of the inaccuracy of the rainfall model used in the laboratory setting. The overall objective of this research is to better quantify the soil loss from natural rainfall events in Missouri, by relating field studies to laboratory experiments and resolving the discrepancies between the two. The majority of soil erosion in Missouri results from a small number of convective storms that occur during the warm season, in the period April-October, and is a function of the kinetic energy of the rain that impacts the soil. Therefore, the project will conduct field studies during the spring and summer of 2005, followed by detailed analysis of the collected data in the fall and winter.

This research will resolve the differences between the assumed total kinetic energy used for most soil erosion calculations by making detailed observations of the drop-size and kinetic energy distribution of natural rainfall in the field and comparing these to similar measurements made in the laboratory. We will thereby assess the errors in the conversion of laboratory studies of soil erosion to actual soil loss. This will lead to better estimates of

natural soil loss providing more realistic modeling of the impact on surface and water quality in Missouri.

There will be three main aspects to the project. First, an examination of raindrop size spectra for natural rain as a function of rainfall intensity will be made by comparing the detailed drop-size spectra measurements of natural rain to standard measurements of rainfall intensity observed using rain gauges and radar; second, an examination of the horizontal velocity of raindrops impacting the surface by using a video drop recorder; and third, comparison of soil erosion and runoff rates from controlled samples of soil under laboratory and natural rain to assess the kinetic energy influence from the horizontal wind component.